



ICAO ENGINE nvPM EMISSIONS DATA SHEET

SUBSONIC ENGINES

ENGINE IDENTIFICATION: V2524-A5 SelectOne™ Upgrade Package BYPASS RATIO (-): 4.8
 UNIQUE ID NUMBER: 01P10IA020 PRESSURE RATIO π_{c0} (-): 27.0
 COMBUSTOR: Floatwall
 ENGINE TYPE: MTF RATED OUTPUT F_{00} (kN): 108.9

REGULATORY DATA

CHARACTERISTIC VALUES:	LTO _{mass} /F ₀₀ (mg/kN)	LTO _{num} /F ₀₀ (particles/kN)	NVPM MASS CONCENTRATION ($\mu\text{g}/\text{m}^3$)
LTO/F ₀₀ AND MAX nvPM _{mass}	1058.7	9.34E+15	1766
AS % OF CAEP/10 LIMIT	-	-	27.9
AS % OF CAEP/11 LIMIT (InP)	45.9	64.7	
AS % OF CAEP/11 LIMIT (NT)	213.2	153.4	

MEASURED DATA

MODE	POWER SETTING (%F ₀₀)	TIME minutes	FUEL FLOW kg/s	EMISSIONS INDICES*		NVPM MASS CONCENTRATION PEAK nvPM _{mass} ($\mu\text{g}/\text{m}^3$)
				EI _{mass} (mg/kg)	EI _{num} (particles/kg)	
TAKE-OFF	100	0.7	1.040	239.3	1.10E+15	
CLIMB OUT	85	2.2	0.867	340.2	1.44E+15	
APPROACH	30	4.0	0.326	235.4	2.37E+15	
IDLE	7	26.0	0.133	72.9	1.61E+15	
LTO TOTAL (kg, mg, number of particles)			444	82945	7.32E+17	-
NUMBER OF ENGINES				1	1	1
NUMBER OF TESTS				3	3	3
AVERAGE LTO/F ₀₀ VALUES (mg/kN, particles/kN)				761.7	6.72E+15	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ($\mu\text{g}/\text{m}^3$)				448.7	2.87E+15	1372

* Emissions Indices are corrected for thermophoretic loss and fuel hydrogen content

DATA FOR EMISSIONS INVENTORIES (ESTIMATIONS FOR ENGINE EXIT PLANE VALUES)

MODE	POWER SETTING (%F ₀₀)	CORRECTED EMISSIONS INDICES	
		EI _{mass_SL} (mg/kg)	EI _{num_SL} (particles/kg)
TAKE-OFF	100	271.8	2.64E+15
CLIMB OUT	85	384.8	3.39E+15
APPROACH	30	283.9	7.41E+15
IDLE	7	97.3	6.97E+15

AMBIENT CONDITIONS

	From	To	FUEL	
BAROMETER (kPa)	100.9	101.6	HEAT OF COMBUSTION (MJ/kg)	43.22
TEMPERATURE (K)	275.8	278.2	HYDROGEN CONTENT (%mass)	13.83
HUMIDITY (kg water/kg dry air)	0.0018	0.0025	AROMATICS CONTENT (%vol)	16.6
			NAPHTHALENE CONTENT (%vol)	2.38
			SULPHUR CONTENT (ppm by mass)	540

MANUFACTURER: International Aero Engines
 TEST ORGANIZATION: Pratt & Whitney
 TEST LOCATION: East Hartford, CT
 TEST DATES: 12/12/2016-14/12/2016

REMARKS

1. Data from certification report IAE-0324
2. Engine performance reflects SelectOne™ and SelectTwo™ package upgrades
3. nvPM levels in accordance with Annex 16 Vol. II, Chapter 4, Appendix 7 and Appendix 8.